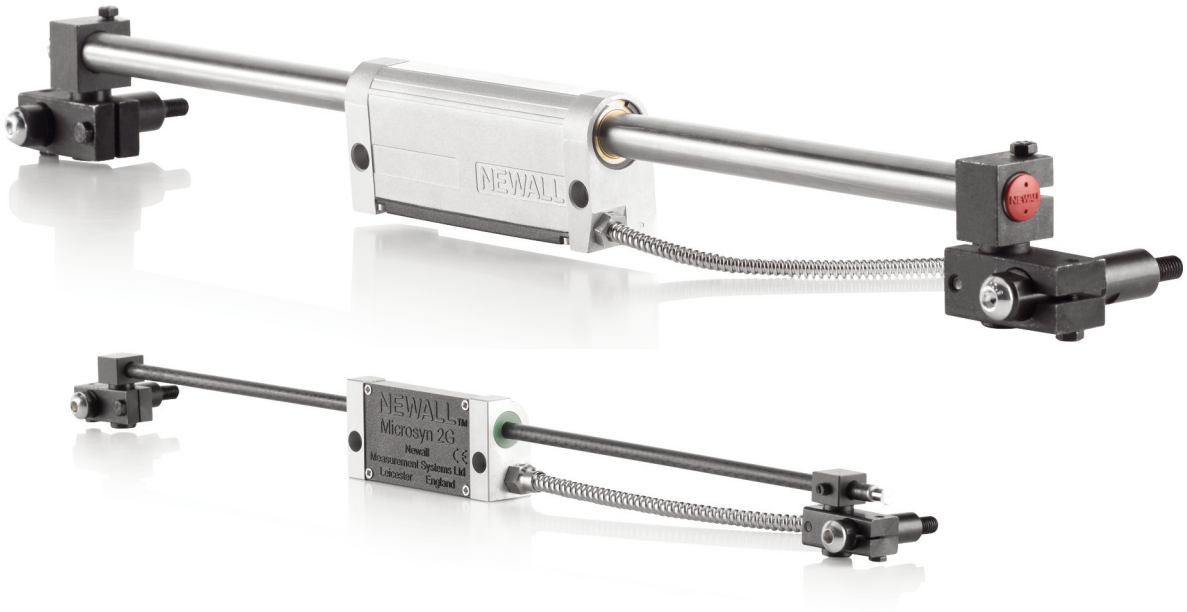
NEWALL

Spherosyn & Microsyn Linear Encoders



Installation Guide

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1.0 INTRODUCTION

This manual will provide mounting instructions for Newall's Spherosyn and Microsyn Linear Encoders. It is important that you read and understand this manual prior to beginning the installation.

If at any time during the installation you should have any questions, contact Newall or your local authorised representative.

1.1 Bracketry

Due to the variety of machine types and applications, it will be necessary to design, make and fit custom brackets for the encoder assembly. If bracketry is needed make certain they are rigid enough not to allow any flexing or distorting while the machine is in operation. Newall offers a variety of bracket kits to aid in the installation. Contact Newall or your local authorised representative for details.

1.2 Preparation

Prior to beginning the installation the machine should be studied to determine where the Encoder(s) will be fitted.

For best results, it is recommended that the Encoder be fitted as close to the machine lead screw or axial drive shaft as possible.

Spherosyn: Overall Length = Travel + 258mm (10.2")
Microsyn: Overall Length = Travel + 173mm (6.8")

Outboard mounting of the scale support brackets will add approximately 20mm (3/4") to the stated travel. (Refer to Appendix A & B)

For a more compact installation, scale travels of 300mm (12") or less may be fitted by supporting one end of the scale only by use of a single end mounting block. (Refer to Figure 5.4 and 5.10)

The moving member of the Encoder assembly can be either the Reader Head or the Scale.

Cable routing from the Reader Head should be examined (See Section 7). Each Reader Head is provided with either a 3.5 metre (11'), 7 metre (22') or 10 metre (33') of armoured cable. Extension cables are available in 1 metre (3'), 2 metre (6'), 3.5 metre (11.5'), 5 metre (16.5') and 10 metre (32') lengths. Contact Newall or your local authorised representative for details.
For Encoders larger trhan 1500mm (60") travel, a setup tube (blank scale) is recommended.

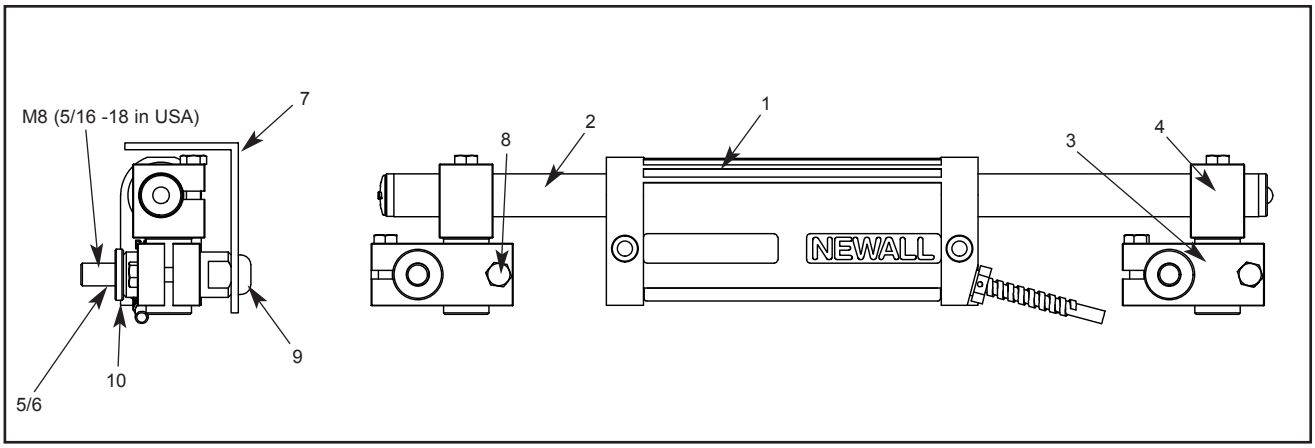
1.3 Warnings

If for any reason the machine axis travel is greater than the actual scale travel it is recommended that 'mechanical stops' are fitted to the machine to avoid damage caused by over travel. Newall will not accept responsibility for Scale and Reader Head damage caused by machine over travel.

Both the Reader Head and the Scale are precision made components and it is important that they are handled with care. By design the Encoders can withstand the rigours of the harsh workshop environment. However, permanent damage can occur through bending or severe impact.

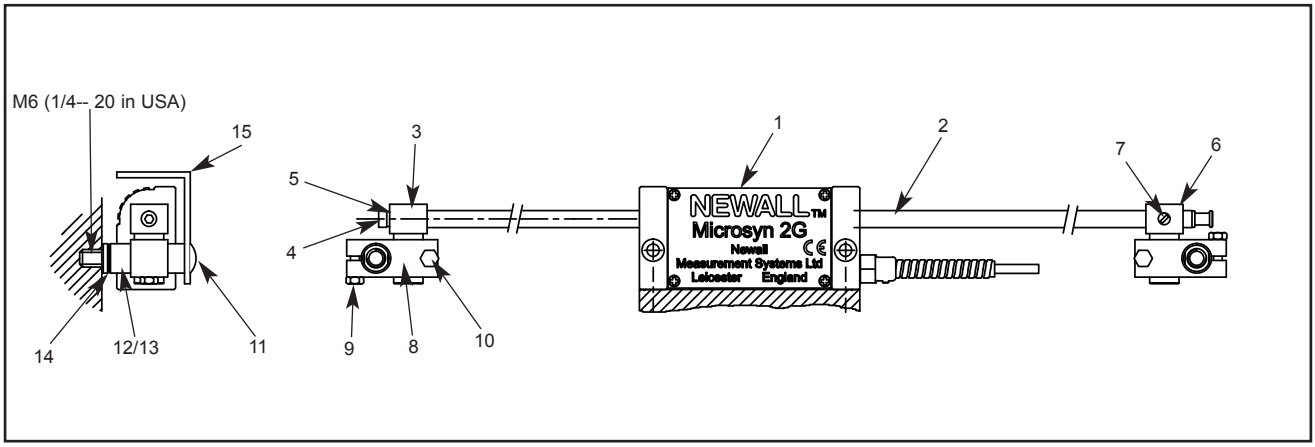
It is important that the Scale be kept at least 13mm (0.5") away from any magnetic bases on indicators or magnetic chucks.

2.0 SPHEROSYN ENCODER ASSEMBLY (<2.5m/100")



Item	Description	Qty	Item	Description	Qty
1	Spherosyn Reader Head	1	6	Support Pillar Long	2
2	Spherosyn Scale	1	7	Scale Cover	1
3	Scale Support Link	2	8	M5 x 20 Hex Head	6
4	Scale Anchor Pin	2	9	M8 x Socket Button Head	2
5	Support Pillar Short	2	10	Spacer Washer	2

3.0 MICROSYN ENCODER ASSEMBLY



Item	Description	Qty	Item	Description	Qty
1	Microsyn Reader Head	1	8	Support Link	2
2	Microsyn Scale	1	9	M3 x 12 Hex Screw	4
3	Scale Anchor pin	1	10	M3 x 12 SHCS	4
4	M3 x 16 SHCS	1	11	M6 x 10 Socket Button Head	2
5	M3 Spring Washer	1	12	Support Pillar Short	2
6	Scale Support Pin	1	13	Support Pillar Long	2
7	M4 x 5 Nylon Set Screw	1	14	Spacer Washer	2
			15	Scale Cover	1

4.0 MOUNTING THE READER HEAD

4.1 Spherosyn

Mount the Reader Head together with its bracket(s) to the machine and secure the assembly parallel with axis travel to within +/-0.05mm (0.002"). (Refer to Figure 4.1)

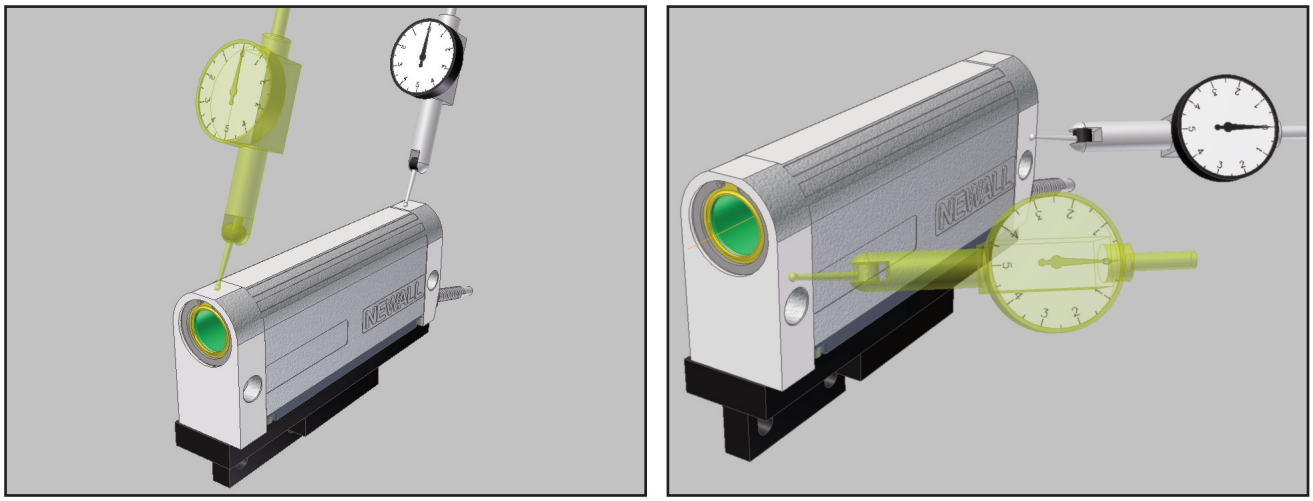


Figure 4.1 - Alignment of the Spherosyn Reader Head

Final adjustments can be carried out by use of laminated shims, which are included with each encoder assembly. Each layer of shim is equivalent to 0.05mm (0.002").

4.2 Microsyn

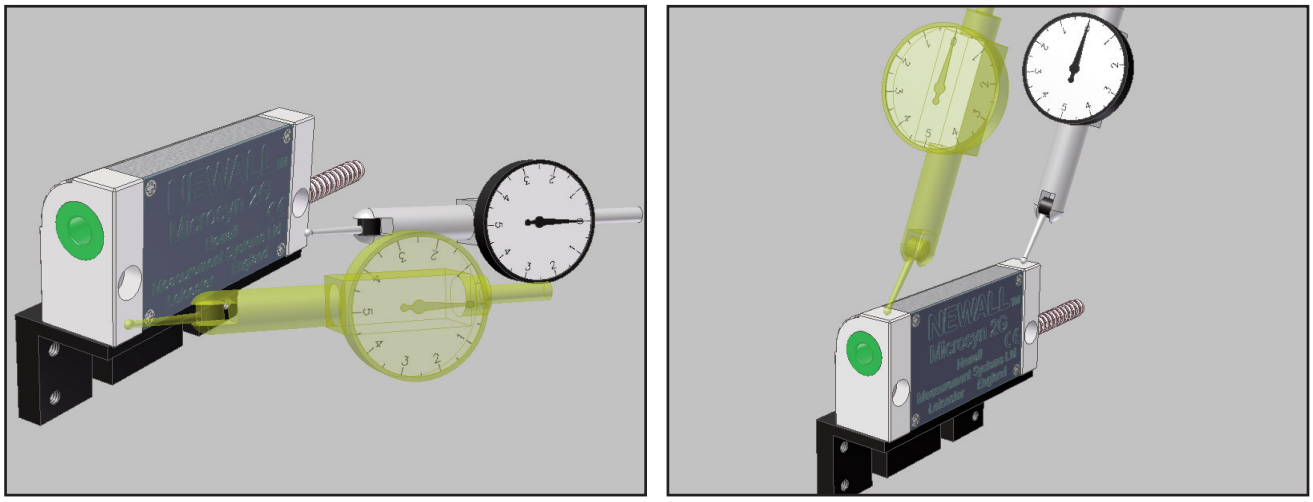


Figure 4.2 - Alignment of the Microsyn Reader Head

Mount the Reader Head together with its bracket(s) to the machine and secure the assembly parallel with axis travel to within 0.05mm (0.002"). (Refer to Figure 4.2)

5.0 MOUNTING THE SCALE

5.1 Spherosyn

5.1.1 Double End Mounting

Note: Refer to section 5.1.3 for mounting scales in excess of 2.5 metres.

Each end of the Spherosyn Scale is different and can be identified by the red cap screw at the 'tensioner end' and a nylon snap rivet at the 'fixed end'.

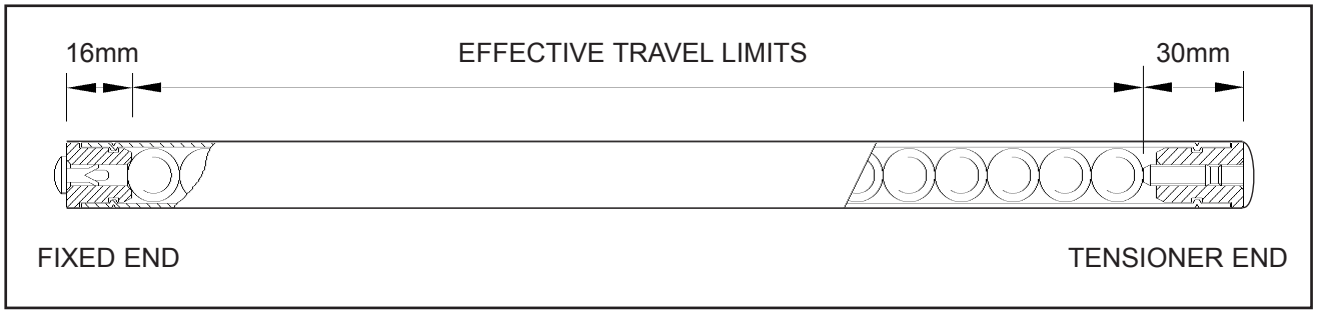


Figure 5.1 - Spherosyn Scale

NOTES:

(A) Erroneous readings will occur if the Reader Head is allowed to travel beyond the Effective Travel Limits. (Refer to Figure 5.1)

(B) The pre-load on the balls are factory set via the set screw at the tensioner end. Do not tamper with or adjust the set screw as this will alter the calibration and accuracy specification of the scale. (Refer to Figure 5.1)

Once the Reader Head is secured and correctly aligned, the scale support brackets can now be fitted. The scale support brackets consist of the support pin, the support link and the pillar(s).

Traverse the machine to its maximum position toward the non-cable entry side of the Reader Head. Maximum position means all available travel, including hand winding past any electrical limits or trip dogs.

Carefully slide the blank scale (or Spherosyn scale if less than 60" travel), allowing for a sufficient amount of scale to project from the Reader Head in order to fit the scale support brackets.

Assemble the scale support link to the scale support pin leaving approximately 3mm (1/8") gap between the bottom of the pin shoulder and the top of the link.

Slide the link/pin assembly onto the scale to approximately 5mm (0.2") away from the end of the Reader Head.

Transfer punch through the support link and into the machine casting. It is important that the support link is kept square to its mounting surface at all times.

Remove the link/pin assembly and the scale from the Reader Head. Drill and tap M8 x 18mm deep (USA 5/16 - 18 x 3/4" deep) into the machine casting as marked by the transfer punch. Fit the pillar(s) to the machine casting by using one of the methods shown in Figure 5.3. The pillar should fit square and flush to the machine surface.

A maximum of two support pillars may be screwed together to allow for sufficient adjustment of the scale. If two pillars are insufficient to enable the scale to be mounted, then additional brackets will be necessary. These brackets must be sufficiently rigid to eliminate any axial movement of the scale.

Loosely fit the support link/pin assembly onto the pillar and pass the scale through the Reader Head and into the support pin. While gently sliding the scale forward and back 25 - 50mm (1" - 2") through the support pin, carefully tighten the hex screws on the support link, ensuring that the scale slides smoothly through the Reader Head and into the support pin. If any interference is detected then fully loosen the hex screws on the support link and repeat this step.

Note: Do not force the Scale through the Support Pin

IMPORTANT WARNING:

THE CENTRE LINE BORE OF THE READER HEAD MUST BE IN DIRECT ALIGNMENT WITH THE CENTRE LINE BORE OF THE SUPPORT PIN. PERMANENT DAMAGE TO SCALE AND/OR ERRONEOUS READER WILL OCCUR IF THIS WARNING IS NOT FOLLOWED. REFER TO FIGURE 5.2

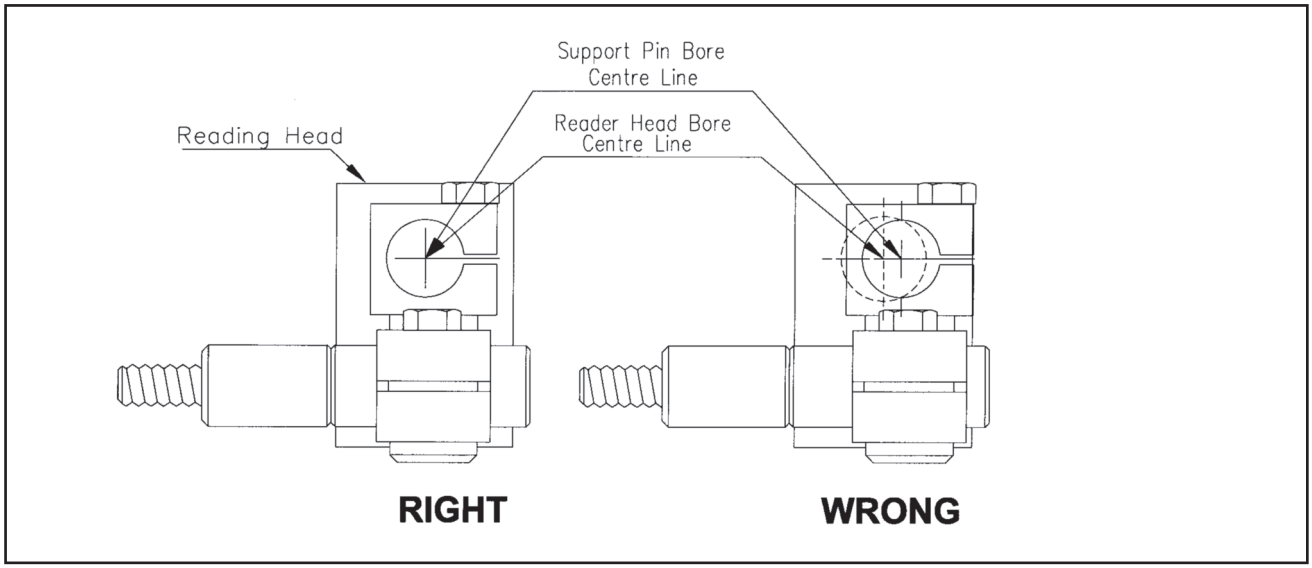


Figure 5.2 - Reader Head and Bracket Alignment

Remove the scale from the Reader Head and traverse the machine to its full extent in the **opposite direction**. Full extent means hand winding past electrical limits.

Assemble the scale support link to the scale support pin leaving approximately 3mm (1/8") gap between the bottom of the pin shoulder and the top of the link.

Slide the link/pin assembly onto the scale making certain that there is sufficient clearance between the Reader Head and the support link to prevent damage to the Reader Head cable. Do not secure the support pin to the scale at this time.

Transfer punch through the support link and into the machine casting. It is important that the support link be kept square to its mounting surface at all times.

Remove the link/pin assembly and the scale from the Reader Head. Drill and tap M8 x 18mm deep (USA 5/16" -18 x 3/4" deep) into the machine casting as marked by the transfer punch. Fit the pillar(s) to the machine casting by using one of the methods shown in figure 5.3. The pillar shoulder fits square and flush to the machine surface.

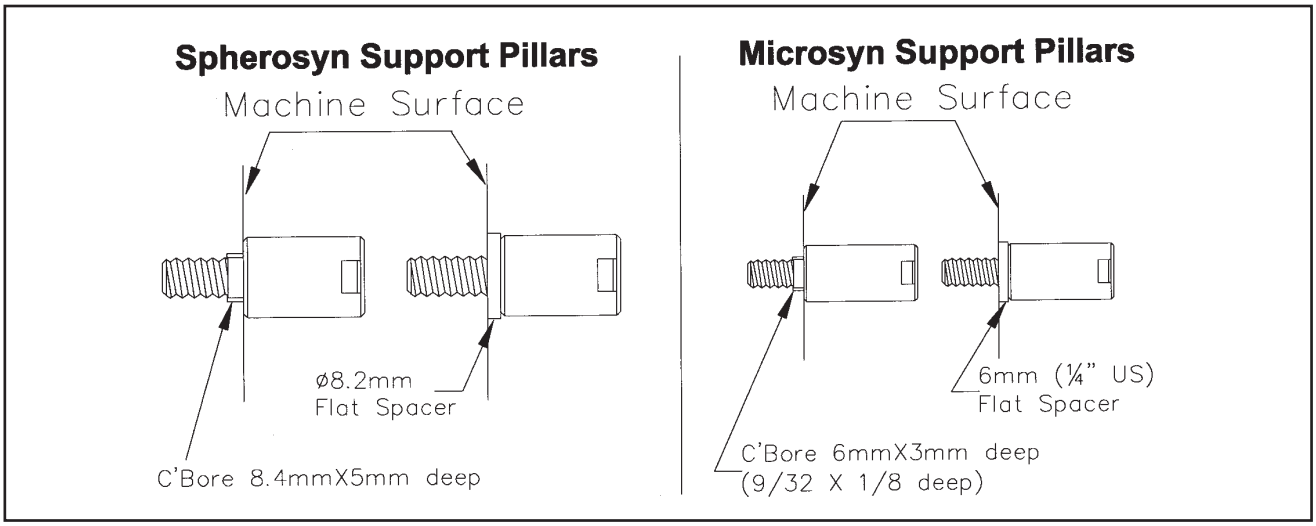


Figure 5.3 - Support Pillars

A maximum of two support pillars may be screwed together to allow for sufficient adjustment of the scale. If two pillars are insufficient to enable the scale to be mounted, then additional brackets will be necessary. These brackets must be sufficiently rigid to eliminate any axial or radial movement of the scale.

Loosely fit the support link/pin assembly onto the pillar and pass the scale through the Reader Head and into the support pin. While gently sliding the scale forward and back 25 - 50mm (1" - 2") through the support pin, carefully tighten the hex screws on the support link, ensuring that the scale slides smoothly through the Reader Head and into the support pin. If any interference is detected then fully loosen the hex screws on the support link and repeat this step.
Repeat the above steps at the other end of the machine. Then carefully slide the Spherosyn Scale through the support pin, through the Reader Head and into the opposite support pin. Tighten the hex screws on the anchor pins.

5.1.2 Single End Mounting

Note: The maximum total length of the scale must not exceed 610mm (24") when using a single end mounting kit. The single end mounting kit is sold separately, ask for UK part number 600-63610, USA part number 294-23010.

Remove the white rivot from the fixed end of the scale.

After the Reader Head has been installed slide the scale through the Reader Head and insert the fixed end of the scale into the single end mounting block. (Refer to Figure 5.4)

Once the position for the single end mounting block has been determined mark the machine casting using the slot in the mounting block as the guide . Drill and tap M6 x 12mm deep (USA 1/4 - 20 x 1/2"). Fit the mounting block using the M6 (USA 1/4 - 20) socket head cap screw and washer.

Check the alignment by gently sliding the scale through the head and in and out of the mounting block, adjustments may be carried out by altering the M5 jacking screws. When the alignment is complete secure the scale by inserting the M5 screw and washer through the mounting block and into the fixed end of the scale.

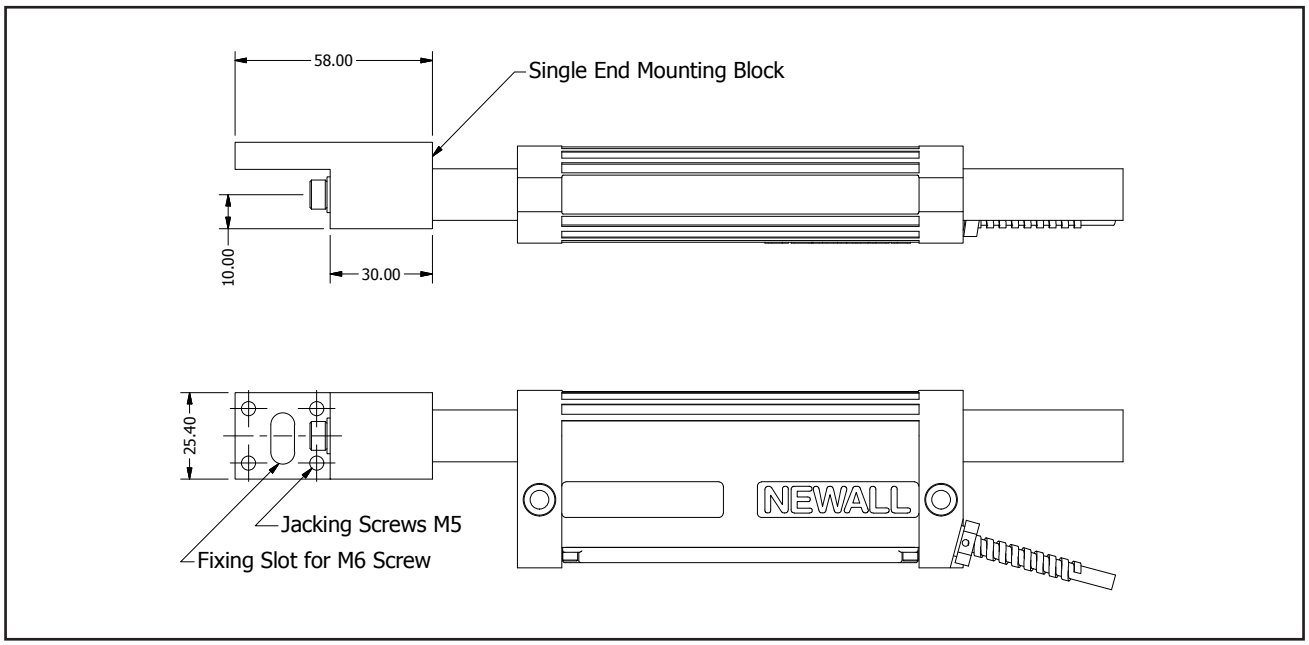


Figure 5.4 - Spherosyn Single End Mounting

5.1.3 Scales in Excess of 2.5 Metres (100”)

Traverse the machine to fullest extent of travel including hand winding past any electrical limits or trip dogs.

Insert the short blank length of Spherosyn tube into the Reader Head, allowing for a sufficient amount of scale to project from the Reading Head in order to fit the scale mounting brackets.

Assemble the angle bracket to the scale clamp (Refer to Figure 5.5). The jacking plate is included in each bracket kit, this will only be required if the machine mounting face is not a machined surface. Slide the assembly onto the scale allowing approximately 10mm clearance from the end of the Reader Head.

Mark the position of the jack plate (if required) or the angle support bracket. Drill and tap the necessary fixing holes and assemble the bracket to the machine.

Remove the blank tube and the bracket assembly from the Reader Head. Drill and tap M8 x 18mm (USA 5/16”-18 x 3/4”) fixing holes. Fit the jack plate (if required) and secure to the machine. Assemble the scale clamp and the angle bracket to the jack plate but do not secure. Traverse the Reader Head as near to the bracket assembly as possible. Slide the blank tube through the Reader Head into the scale clamp. Adjust the brackets into position and carefully tighten the screws. Check that the blank tube slides through the Reader Head and into the scale clamp smoothly without any fouling or interruption.

Remove the blank tube and traverse the machine to the full extent in the opposite direction. Remember the "full extent" is the absolute maximum travel up to the mechanical "dead stops".

Check the overall length of the actual scale and measure from the outside edge of the scale clamp already fitted to the machine and mark the position of the scale on to the machine.

Slide the Spherosyn blank tube into the Reader Head, assemble the remaining scale bracket assembly including the jacking plate (if required) and slide onto the tube.

Set the outside edge of the scale clamp level with the mark that indicates the overall length of the Spherosyn Scale and mark the fixing position for the bracket assembly.

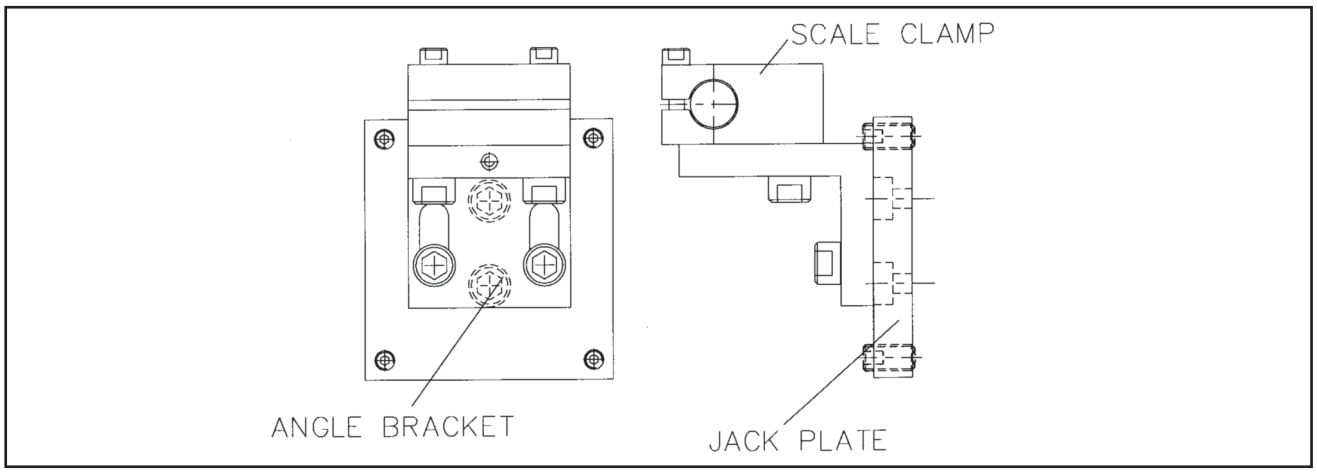


Figure 5.5 - Long Scale Support Bracket Assembly

5.1.4 Center Supports for Scales in Excess of 2.5 Metres (100") Travel

See data sheet supplied with center supports kit 600-84605

5.2 Microsyn Scale

There are two accuracy grades of the Microsyn Encoder , 5µm and 10µm. The 5µm scale can be identified by the black end plug fitted at the tensioner end. The 10µm scale has an anodised clear plug fitted at the tensioner end. The fixed end of the scale has an M3 tapped hole, which will be fitted to the anchor pin when installed.

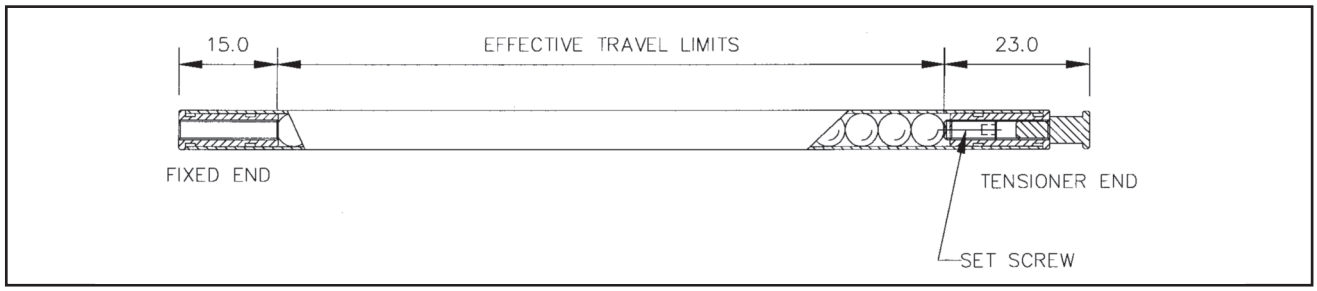


Figure 5.7 - The Microsyn Scale

NOTES:

(A) Erroneous readings will occur if the Microsyn Reader Head is allowed to travel beyond Effective Travel Limits. (Refer to Figure 5.7)

(B) The pre-load on the balls are factory set via the set screw at the tensioner end. Do not tamper with of adjust the set screw as this will alter the calibration and accuracy specification of the scale and void the warranty.

The scale support brackets kit consists of the Anchor Pin, Support Pin , Support Link, and Pillar(s). (Refer to Figure 5.8) In order to avoid the risk of damage to the scale during installation all Microsyn encoders include a set up bar. The set up bar is of the same diameter as the Microsyn Scale and will be used to align the brackets to the Reader Head.

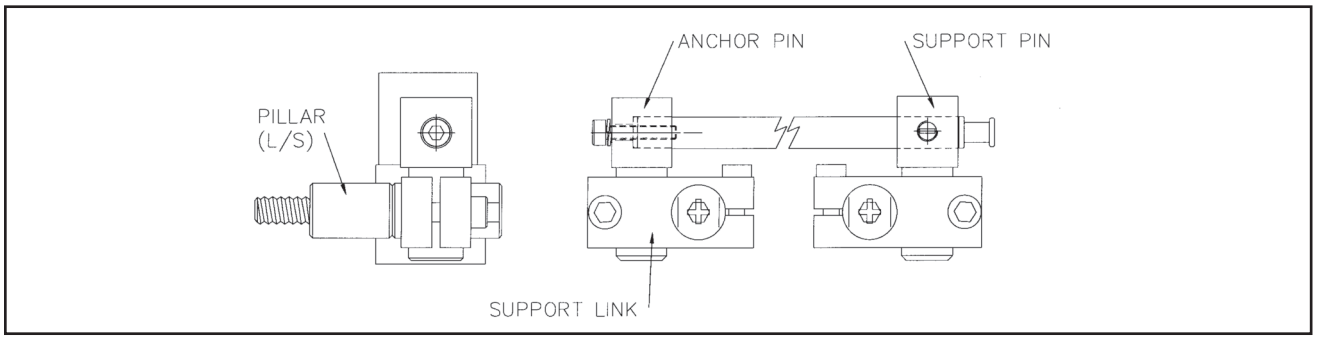


Figure 5.8 - Microsyn Scale Support Bracket

Traverse the machine to its maximum position toward the non-cable entry side of the Reader Head. Maximum position means all available travel, including hand winding past any electrical limits or trip dogs.

Carefully slide the Microsyn Scale set-up bar through the Reader Head, allowing for sufficient scale to project from the Reader Head in order to fit the scale support brackets.

Assemble the support link to the anchor pin leaving approximately 3mm (1/8") gap between the bottom of the anchor shoulder and the top of the link.

Slide the link/anchor assembly onto the scale set-up bar to approximately 5mm (0.2") away from the end of the Reader Head.

Transfer punch through the support link and into the machine casting. It is important that the support link be kept square to its mounting surface at all times.

Remove the link/anchor assembly and the scale set-up bar from the Reader Head. Drill and tap M6 x 12mm deep hole (USA 1/4 - 20 x 1/2") into the machine casting as marked by the transfer punch. Fit the pillar(s) to the machine casting by using one of the methods shown in Figure 5.3. The pillar shoulder fits square and flush to the machine surface.

A maximum of two support pillars may be screwed together to allow for sufficient adjustment of the scale.
If two pillars are insufficient to enable the scale to be mounted, then additional brackets will be necessary. These brackets must be sufficiently rigid to eliminate any axial movement of the scale.

Loosely fit the support link/anchor assembly onto the pillar and pass the scale set-up bar through the Reader Head and into the anchor pin. While gently sliding the scale set-up bar in and out of the anchor pin, carefully tighten the cap screws on the support link, ensuring that the scale set-up bar slides smoothly through the Reader Head and into the anchor pin. If any interference is detected then fully loosen the cap screws on the support link and repeat this step.

Remove the scale set-up bar from the Reader Head and traverse the machine to its full extent in the opposite direction. Full extent means hand winding past electrical limits.

Assemble the scale support link to the support pin leaving approximately 3mm (1/8") gap between the bottom of the mounting shoulder and the top of the link. (Refer to Figure 5.8)

Slide the link/pin assembly onto the scale set-up bar making certain that there is sufficient clearance between the Reader Head and the support link to prevent damage to the Reader Head cable. Do not secure the support pin to the scale at this time.

Transfer punch through the support link and into the machine casting. It is important that the support link be kept square to its mounting surface at all times.

Remove the link/pin assembly and the scale from the Reader Head. Drill and tap M6 x 12mm deep (USA 1/4 - 20 x 1/2 deep) into the machine casting as marked by the transfer punch. Fit the pillar(s) to the machine casting by using one of the methods shown in Figure 5.3. The pillar shoulder fit square and flush to the machine surface.

Loosely fit the support link/pin assembly onto the pillar and pass the scale set-up bar through the Reader Head and into the support pin. While gently sliding the set-up bar forward and back 25 - 50mm (1" - 2") through the support mounting, carefully tighten the screws on the support link, ensuring that the scale set-up bar slides smoothly through the Reader Head and into the support pin. If any interference is detected then fully loosen the screws on the support link and repeat this step.

IMPORTANT WARNING

THE CENTRE LINE BORE OF THE READER HEAD MUST BE IN DIRECT ALIGNMENT WITH THE CENTRE LINE BORE OF THE SUPPORT PIN. PERMANENT DAMAGE TO SCALE AND/OR ERRONEOUS READER WILL OCCUR IF THIS WARNING IS NOT FOLLOWED. REFER TO FIGURE 5.9

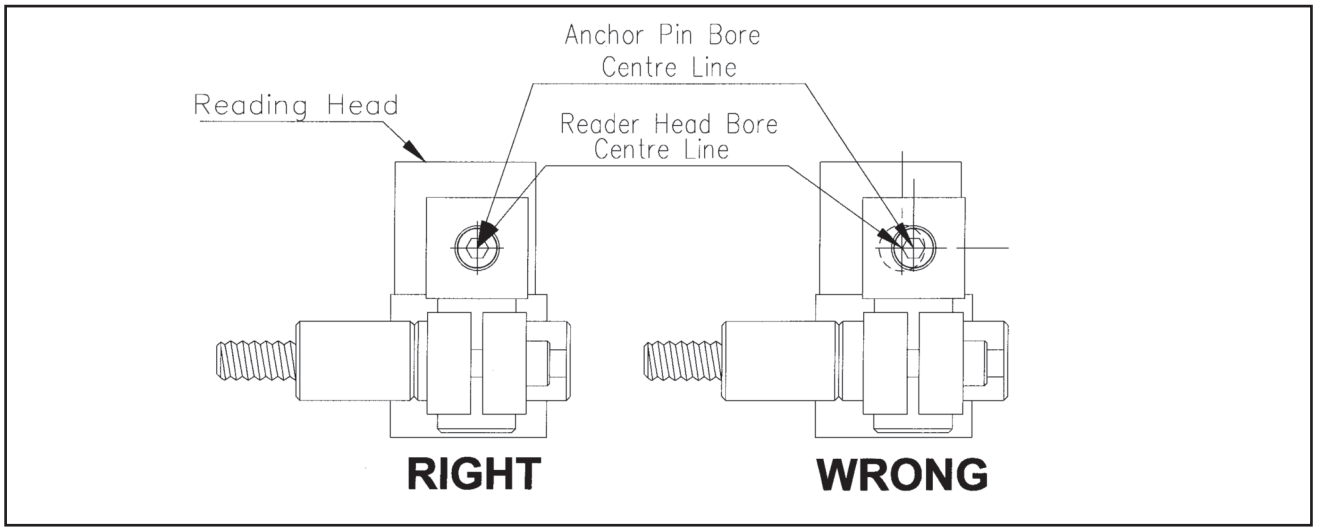


Figure 5.9 - Reader Head and Bracket Alignment

Carefully slide the Microsyn Scale through the support pin, ensuring the fixed end is inserted first, through the Reader Head and into the anchor pin.

Using the M3 x 16 skt cap screw and spring washer, secure the scale to the anchor pin. It is **important** that the nylon set screw on the support pin be only "pinched" to the scale at the tensioner end. DO NOT OVER TIGHTEN THE NYLON SET SCREW ON THE SUPPORT PIN.

5.2.1 Single End Mounting

For installations requiring a lower profile assembly, there is an alternative method for fixing the scale at one end only by way of the single end mounting block assembly (Refer to Figure 5.10). The Microsyn single end mounting kit is sold separately, part number 600-65340.

Note: The maximum total length of scale should not exceed 450mm (18") when using the single end mounting block.

Once the Reader Head has been installed slide the scale through the head and insert the fixed end of the scale into the single end mounting block. (Refer to Figure 5.10)

Once the position for the single end mounting block has been determined mark the machine casting with the slot in the block . Drill and tap a M5 x 12mm deep hole. Fit the bracket using the M5 skt head cap screw and washer. Check the alignment by gently sliding the scale through the head and in and out of the mounting block, adjustments may be carried out by altering the M3 jacking screws. When the alignment is complete secure the scale by inserting the M3 screw and spring washer through the mounting block and into the fixed end of the scale.

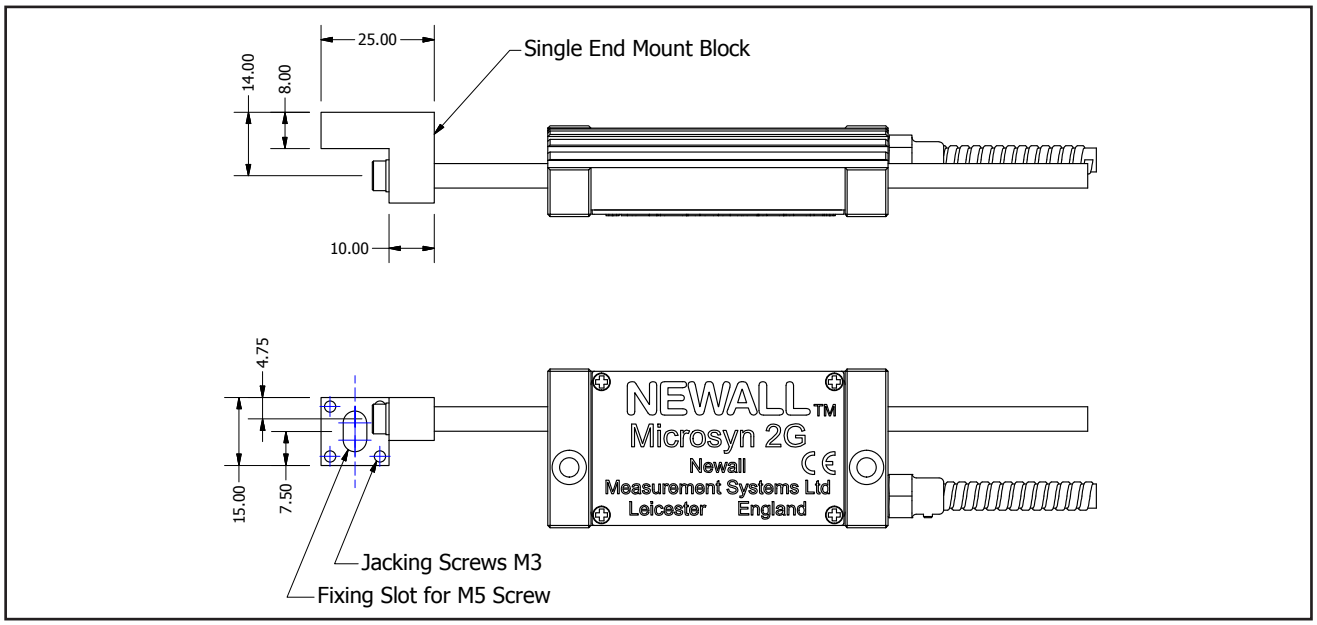


Figure 5.10 - Microsyn Single End Mounting

6.0 FITTING THE SCALE GUARD

Each Encoder includes a protective guard. This aluminium guard is intended to protect the scale from impact damage. The guard can be attached to the machine casting or by means of the scale support pillars. (Refer to Figure 6.1)

To fit the guard to the support pillars, measure and mark off the distance between the centre of each pillar. For Spherosyn drill two 8.5mm (3/8"), for Microsyn 7mm (9/32") holes at either end of the guard. The guard can be attached to the pillars by using the button head screws provided. After the guard is attached, move the machine axis to both extents of its travel ensuring that the guard does not interfere with or rub against the Reader Head.

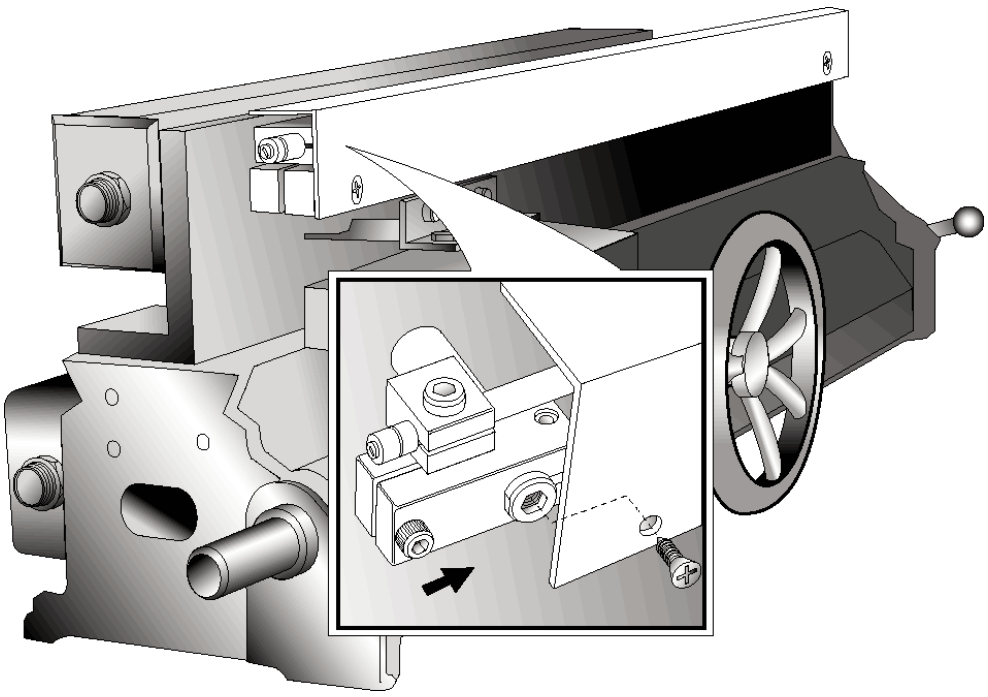


Figure 6.1 - Fitting the Scale Guard (example shown using a Spherosyn Scale)

7.0 CABLE ROUTING

The most important and the most over looked aspect of fitting the Encoder is proper cable routing. Dangling and loose cables can be snagged or broken causing irreparable damage. Care should be taken in order to ensure that the cables are secured to the machine and that cable loops do not interfere with any part of the machine or the Encoder movements. "P" clips and thread forming screws are provided to route the cables from the Reader Head to the digital readout unit.

Note: The armoured cable is an integral part of the Reader Head. If the cable becomes damaged, then it would have to be replaced complete with the Reader Head.

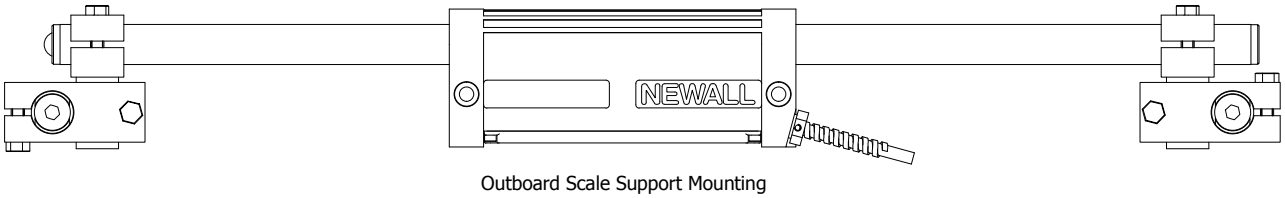
If extension cables are used, do not allow the plug and socket junction to lie in the swarf tray or in the direct flow of coolant or oil.

In order to avoid problems associated with electrical noise and interference, do not allow the cables to lie across electrical motors, fuse boxes or electrical pumps.

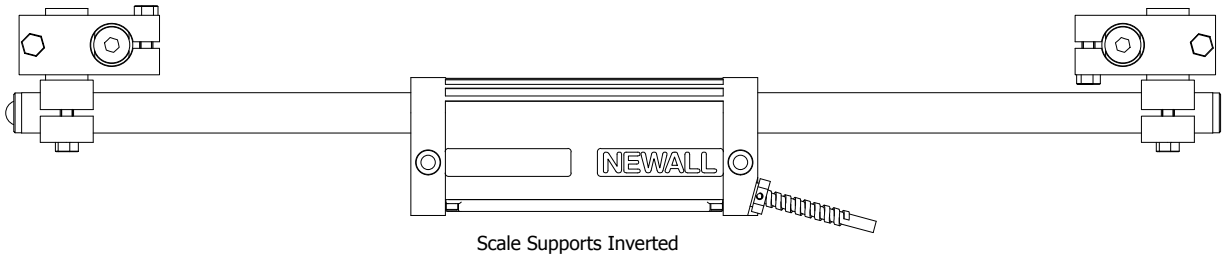
8.0 FINAL CHECK

Prior to putting the Encoder into operation, slowly traverse the machine axis to both extents of its travel checking at all times that the cables are secure and that machine over travel cannot occur. Newall will not accept responsibility for Encoder malfunction caused by over travel or damaged cables.

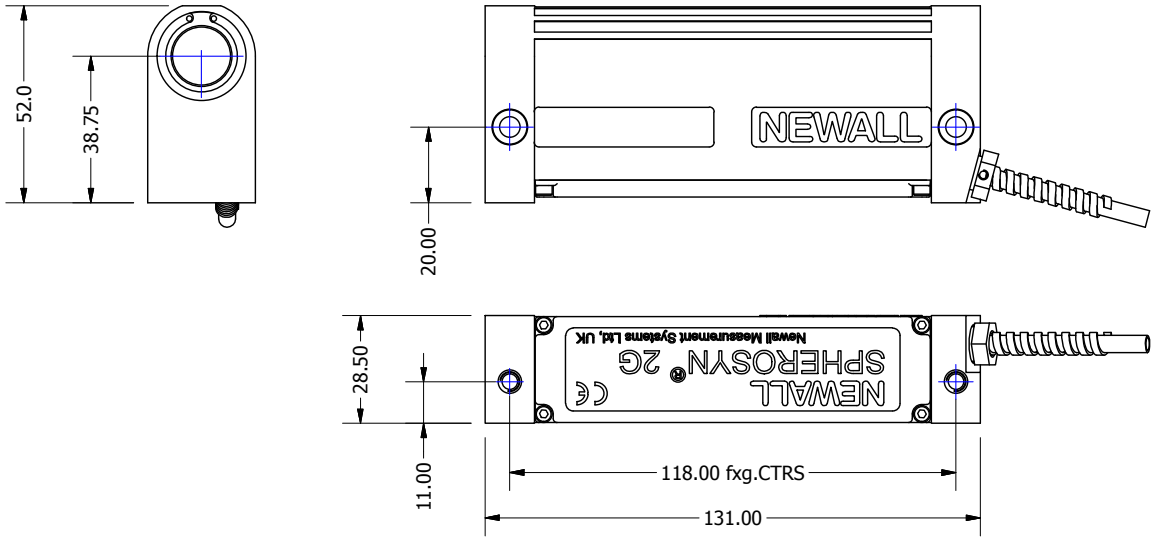
Appendix A - SPHEROSYN



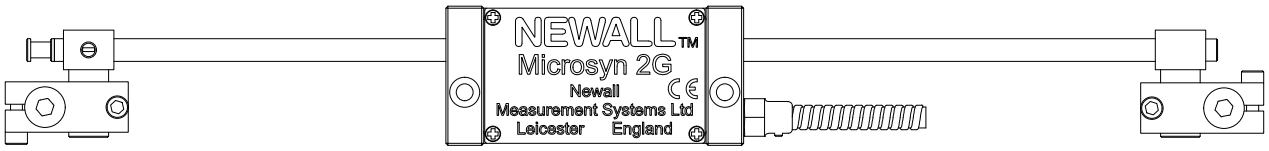
Outboard Scale Support Mounting



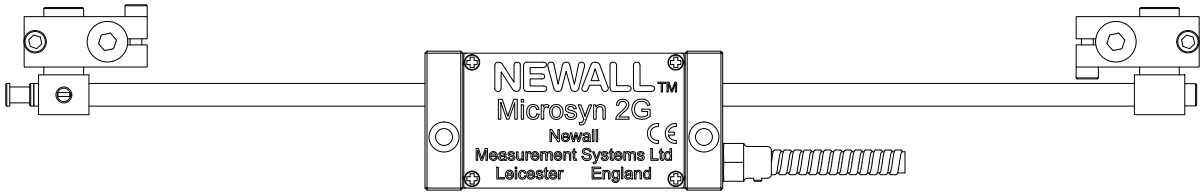
Scale Supports Inverted



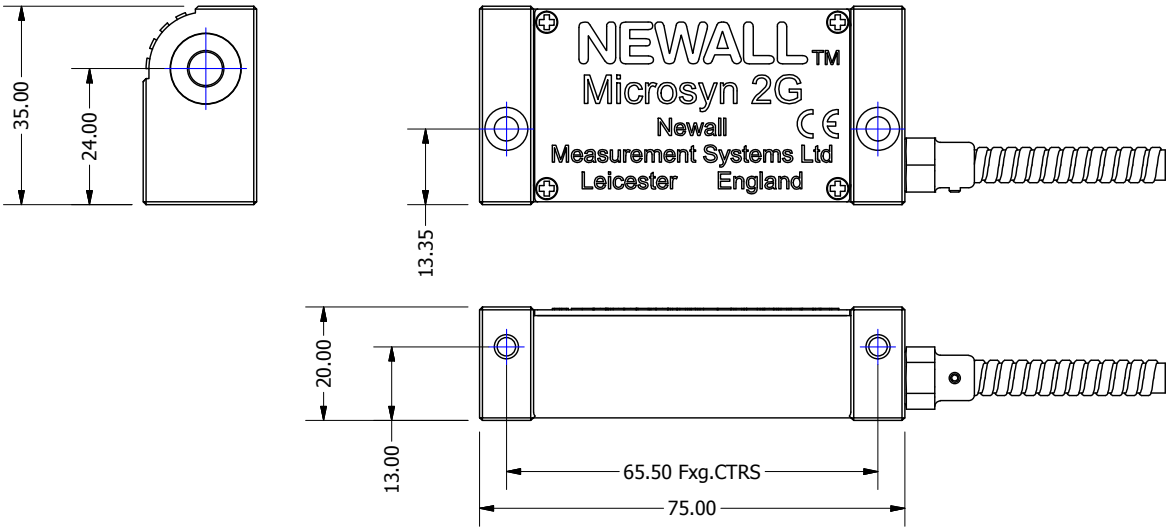
Appendix B - MICROSYN



Outboard Scale Support Mounting



Scale Supports Inverted



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